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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/895,524	06/28/2001	Rafael A. Mena	TI-29612	8193
23494	7590	07/05/2005	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			FOURSON III, GEORGE R	
			ART UNIT	PAPER NUMBER
			2823	
DATE MAILED: 07/05/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/895,524	MENA ET AL.	
	Examiner	Art Unit	
	George Fourson	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

This action is made non-final because of the inadvertent omission of claims 4,7 and 11 from the previous office action and because Ngo et al, previously relied on, is cumulative of the teachings of Tran et al, incorporated by reference therein.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1 and 8 are rejected under 35 U.S.C. 102(a) as being anticipated by Tran et al.

Reliance is now on Tran et al which was incorporated by reference by Ngo et al, previously relied on. Tran et al discloses in figure 4 HDP oxide layer 42 over patterned metal features 41 and 14 and dielectric layer 43 over HDP oxide. HDP oxide layer 42 inherently has sloped edges as indicated by Yao et al (col.1). Formation of vias and contacts to the metal leads is depicted in figure 5, for example.

Claims 2,5,6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al as applied to claims 1 and 8 above, and further in view of Lee.

Tran et al does not disclose the etch-dep ratio or the shape of the HDP oxide on the metal leads.

Lee discloses that in HDP deposition an etch-dep ratio resulting in a 45 degree angle is suitable in gap filling (col.1, lines 24-36).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Tran et al and Lee et al to enable the HDP oxide layer of Tran et al to be formed according to the teachings of Lee and further to enable desirable gap filling characteristics of the HDP oxide.

Lee discloses formation of pyramidal and trapezoidal shapes on the patterned features depending on the width of the features. It would have been obvious to one of ordinary skill in the art to form the metal leads having widths that result in both pyramidal and trapezoidal shapes of the HDP oxide on the leads depending on desired current carrying characteristics of the metal leads.

Claims 3,4,10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al as applied to claims 1 and 8 above, and further in view of Wolf, Vol.2.

Tran et al does not disclose use of PETEOS, silane based oxide or spin-on glass as the dielectric layer. The reference discloses use of TEOS (col.6, line 49) and also discloses use of any of the dielectrics conventionally employed (col.7, lines 26-30).

Wolf, Vol.2, discloses use of PETEOS as an interlevel dielectric layer (p.194, last paragraph), silane based P doped oxide as an interlevel dielectric layer (p.195, last paragraph) and SOG as an interlevel dielectric layer (fig. 4-32). It would have been obvious to one of ordinary skill in the art to combine the teachings of Wolf, Vol.2 with those of Tran et al to enable the dielectric layer of Tran et al to be formed of one of the materials disclosed to be suitable for such a purpose by Wolf, Vol.2.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al as applied to claims 1 and 8 above, and further in view of Tsai et al.

Tran et al does not disclose formation of the HDP oxide layer using F doped oxide.

Tsai et al discloses formation of multilevel interconnects including depositing phosphorous doped HDP liner layer 204 over metal leads 202 followed by gap filling layer 206 (col.3, lines 10-29 and fig.2A). It would have been obvious to one of ordinary skill in the art to combine the teachings of Tran et al and Tsai et al to enable the HDP oxide layer of Tran et al to be formed according to the method of Tsai et al.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al as applied to claims 1 and 8 above, and further in view of AAPA.

Tran et al does not disclose use of HSQ as the dielectric layer.

Applicant admits use of HSQ as an interlevel dielectric layer (instant page 1, lines 25-26) to have been known prior to applicant's invention.

It would have been obvious to one of ordinary skill in the art to combine the known method of forming an interlevel dielectric with the teachings of Tran et al to enable the interlevel dielectric of Tran et al to be formed according to the known method.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Fourson whose telephone number is (571) 272-1860. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571) 272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from

Art Unit: 2823

either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "George Fourson".

George Fourson
Primary Examiner
Art Unit 2823

GFourson
June 30, 2005